

# Discovery of the digger wasp genus *Odontosphex* Arnold, 1951 (Hymenoptera, Apoidea, Spheciformes) in Central Asia, with description of a new species

Mikhail V. Mokrousov<sup>1</sup>, Maxim Yu. Proshchalykin<sup>2</sup>

**1** Institute of Biology and Biomedicine, Lobachevsky State University of Nizhny Novgorod, 603950 Nizhny Novgorod, Russia **2** Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok 690022, Russia

Corresponding author: Maxim Yu. Proshchalykin ([proshchalikin@biosoil.ru](mailto:proshchalikin@biosoil.ru))

---

Academic editor: V. Gokhman | Received 13 May 2021 | Accepted 1 July 2021 | Published 24 August 2021

---

<http://zoobank.org/C7720949-186A-4B7E-BC45-BD8FD840EFD7>

---

**Citation:** Mokrousov MV, Proshchalykin MYu (2021) Discovery of the digger wasp genus *Odontosphex* Arnold, 1951 (Hymenoptera, Apoidea, Spheciformes) in Central Asia, with description of a new species. In: Proshchalykin MYu, Gokhman VE (Eds) Hymenoptera studies through space and time: A collection of papers dedicated to the 75<sup>th</sup> anniversary of Arkady S. Lelej. Journal of Hymenoptera Research 84: 137–143. <https://doi.org/10.3897/jhr.84.68610>

---

## Abstract

The genus *Odontosphex* Arnold, 1951 is newly recorded from Central Asia. A new species, *Odontosphex leleji* sp. nov., is described and illustrated based on males from Turkmenistan (Badkhyz Nature Reserve, Eroyulanduz valley). Keys to males and females of all known species of *Odontosphex* are provided.

## Keywords

Crabronidae, new record, Odontosphecini, Palearctic, taxonomy, Turkmenistan

## Introduction

*Odontosphex* Arnold, 1951 is a small and little-known genus including only six species. Arnold (1951) described this genus based on a single male of his new species *O. bidens* Arnold, 1951 from Mauritania. Currently, this species is also known from southern Palearctic, i.e., Saudi Arabia, Iran and Pakistan (Bohart and Menke 1976; Pulawski 1991) (all collected Palearctic individuals are females, attributed to this species tentatively).



In addition, Menke (1967) described *O. paradoxus* Menke, 1967, *O. fritzi* Menke, 1967 and *O. willinki* Menke, 1967 from Argentina, and Pulawski (1991) described another species, *O. damara* Pulawski, 1991 from Namibia. The new species *O. leleji* sp. nov. from Turkmenistan is therefore the second representative of the genus in the Palaearctic fauna.

Species of the genus *Odontosphex* inhabit sandy or salty biotopes in arid regions. Nesting biology unknown.

## Materials and methods

This paper is based on the materials collected by N.V. Kurzenko (Vladivostok, Russia) during his expedition to Central Asia in 1990. Type specimens of the new species are deposited in collection of the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia) (**ZISP**) as well as in the personal collection of M.V. Mokrousov (**MMC**).

Photographs were taken with a combination of a digital camera Canon EOS M200 and Carl Zeiss Stemi 508 (Fig. 1A, B), Olympus SZX16 stereomicroscope (Figs 1C–E, 2A–C, 2F) and Olympus CX33 microscope (Fig. 2D, E). Final images representing a composite of several photographs taken at different focal planes were combined using Helicon Focus 7.6.1. All images were post-processed for contrast and brightness using Adobe Photoshop v. CC 2017 (×64).

Morphological terminology generally follows Hymenoptera Anatomy Ontology Portal (2021) and Bohart and Menke (1976): e.g., we have used these abbreviations: **F** – flagellomere; **S** – metasomal sternum; **T** – metasomal tergum; **L** – length; **H** – height; **W** – width. Body length measurements and measurement ratios are rounded off to 0.1 mm and 0.01 respectively.

## Taxonomy

Taxonomic position of *Odontosphex* is controversial. Arnold (1951) assigned this genus to the subfamily Larrinae, but Menke (1967) pointed out certain contradictions and assigned *Odontosphex* to Philanthinae. Based on the unpublished doctoral thesis of Prentice (1998; personal communication by W. Pulawski), Pulawski (2021) placed *Odontosphex* within the subfamily Pemphredoninae.

Both Melo (1999) and Sann et al. (2018) attributed *Odontosphex* to Pseninae (Psenidae), based on morphology and DNA analysis respectively. At the same time, *Odontosphex* shares a number of substantial taxonomic features with Laphyragoginae, and this unique combination of characters does not occur in other taxa. The most important of these features are: hindwing with large and broad jugal lobe, as well as with media diverging before cu-a (Fig. 2F), similar forewing venation; single midtibial spur; contiguous midcoxae; occipital and hypostomal carinae form thin partition dividing hypostomal and occipital cavities; inner orbits of eyes converging above; antennal



sockets not contiguous with frontoclypeal suture; upper margin of clypeus medially not expanded upward; pronotum with low collar; propodeum long; metapostnotum rather inconspicuously defined, triangular, its apex extending onto vertical posterior surface; male genitalia with volsella differentiated into digitus and cuspis; cerci absent.

All the data presented above therefore collectively suggest that further research is needed to reliably establish the taxonomic position of *Odontosphex*.

### Genus *Odontosphex* Arnold, 1951

*Odontosphex* Arnold, 1951: 154. Type species: *Odontosphex bidens* Arnold, 1951, by original designation and monotypy.

**Diagnosis.** The genus *Odontosphex*, according to Menke (1967), Bohart and Menke (1976) and Pulawski (1991) with clarifications, is characterized by: eyes in males nearly holoptic, in females conspicuously converging above; lateral ocelli vestigial and close to midocellus; clypeus transverse and apicomediaally with two to seven teeth, no lateral clypeal brushes in male, upper margin medially not unusually expanded upward; antennae short and with F1 not longer than F2, antennal sockets separated from clypeus by not more than two their diameters; no subantennal sclerite defined by lines from antennal sockets through tentorial pits to clypeus; a small tubercle between antennae; mandible edentate and with socket not completely closed, no hairbrushes in male; palpal formula 6–4; pronotal collar thin, depressed and appressed to scutum; episternal sulcus absent; scrobal sulcus absent or weakly indicated; omaulus present or absent; propodeum long; metapostnotum defined, wide and triangular, with a median longitudinal carina, its apex extending onto vertical posterior propodeal surface; foretarsal rake of female consists of short spines, absent in male; midcoxae nearly contiguous; midtibia with one apical spur; hindcoxa with lamella at inner apex; hindfemur truncate apically; plantulae present; marginal cell of forewing acutely narrowed and slightly separated from wing edge toward apex; second submarginal cell not petiolate in front and receiving both recurrent veins; hindwing media diverging before cu-a; jugal lobe occupying about four-fifth length of anal area; metasoma sessile; female S6 not cleft apically; male S8 somewhat narrowed and triangularly emarginated at apex; female with pygidial plate; no cerci; volsella differentiated into digitus and cuspis.

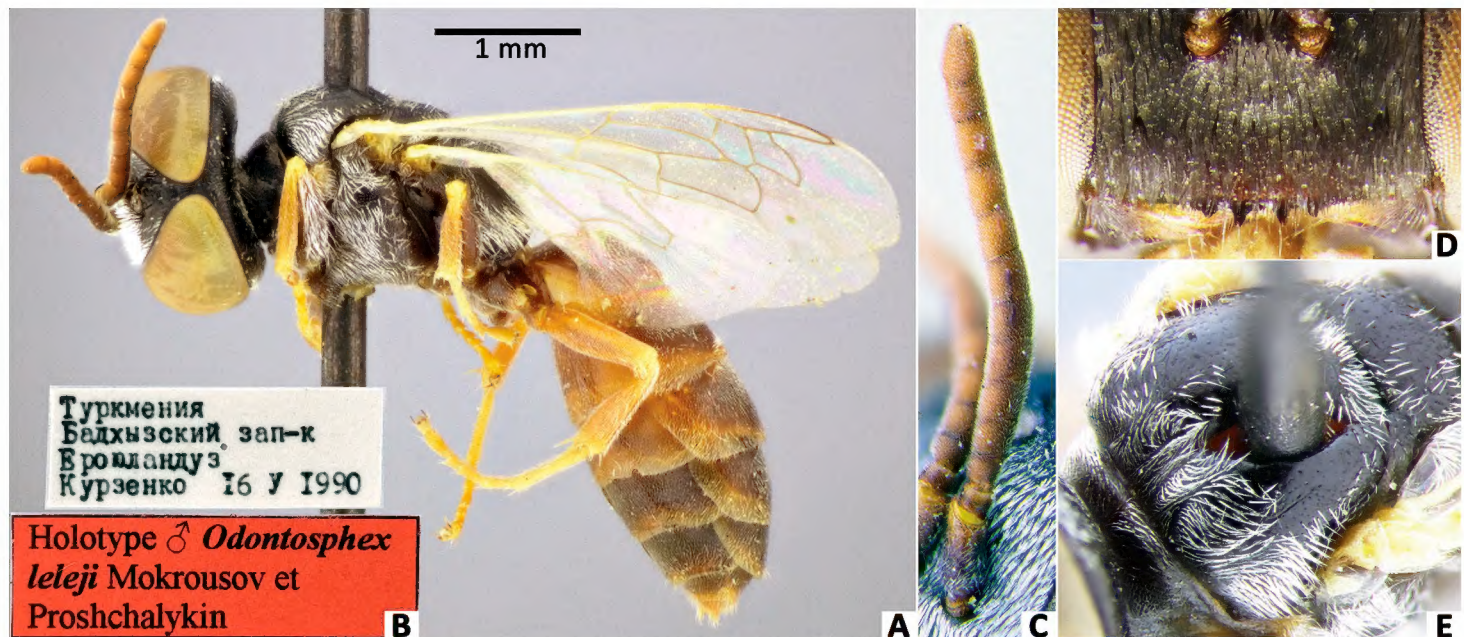
### *Odontosphex leleji* sp. nov.

<http://zoobank.org/7C5DB28B-C308-48EC-AF37-8BB0D3ACBEDD>

Figures 1A–E, 2A–F

**Material examined. Holotype:** ♂, Туркмения / Бадхызский зап-к / Ероюландуз / Курзенко 16 V 1990 [Turkmenistan, Badkhyz Nature Reserve, Yeroyulanduz valley, 35.70°N, 61.97°E, 16.V.1990, leg. N. Kurzenko] // Holotype ♂ *Odontosphex* / *leleji*





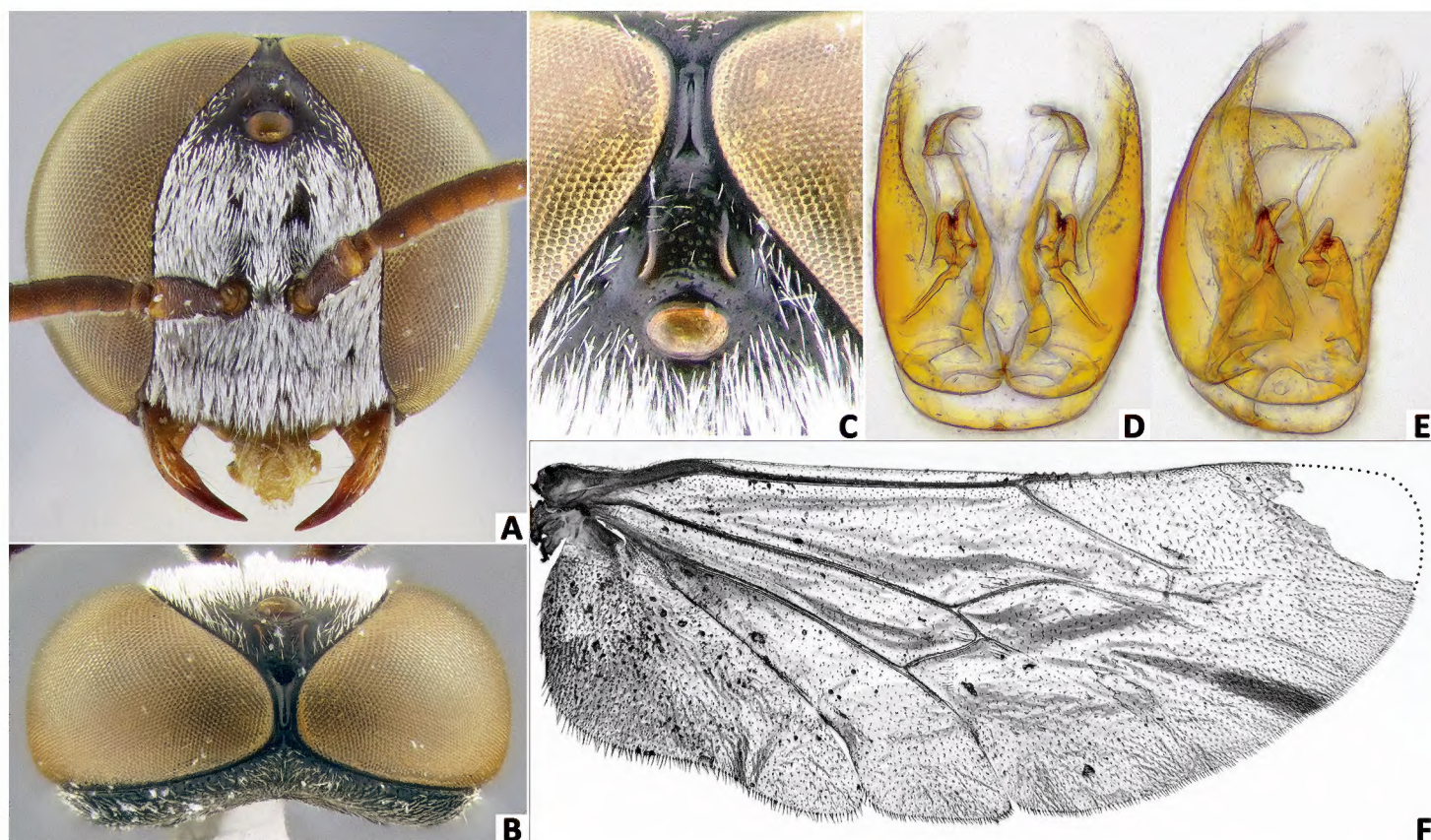
**Figure 1.** *Odontosphex leleji* sp. nov., holotype, male **A** habitus, lateral view **B** original labels **C** antenna, ventral view **D** clypeus and lower part of frons, frontal view **E** mesosoma, anteriodorsolateral view.

Mokrousov et / Proshchalykin [ZISP]. **Paratypes:** 3 ♂, with same data as the holotype [2 ♂ in ZISP, 1 ♂ in MMC].

**Diagnosis.** *Odontosphex leleji* sp. nov. clearly differs from the other Palearctic species, *O. bidens* Arnold, by a 4-dentate clypeus, longer basal flagellomeres and not swollen flagellar segments (in the male of *O. bidens* the clypeus is bidentate, the basal flagellomeres are transverse, F7 and F10 are swollen behind); from Afrotropical *O. damara* Pulawski, the new species differs by short setation on vertex and T1, and by coloration of the body with brown, yellow and reddish pattern (*O. damara* has long erect setae on the vertex and base of T1, and predominantly black body).

**Description. Male.** Body length 5.8–7.1 mm (holotype: 6.0 mm); fore wing length 3.7 mm (holotype). Head (Fig. 2A–C). Head ratio H:W = 0.84 (Fig. 2A); eyes markedly convergent above, vertex linear, least interocular distance equal to  $0.3 \times$  transverse midocellar diameter, with central longitudinal sulcus (Fig. 2B, C) which continues behind as very thin line. Posterior ocelli elongated, flattened and inconspicuous. Clypeus short, about half length from anterior margin to antennal sockets at middle; central part of anterior margin with two long median and two triangular lateral teeth (Fig. 1D). Occipital carina well developed, joining hypostomal carina and then forming thin partition dividing hypostomal and occipital cavities. Antennae thickened, flagellomeres without swellings or excisions, F1–F5 nearly as long as wide, F6–F11 longer than wide; F4–F9 with tyloids, which are very small, in form of tubercles on F4 and F9, and oval, protruding and clearly visible on F5–F8 (Fig. 1C). Lower frons and clypeus with dense silver setation concealing integument; upper frons dull, with spaced small punctures, ocellar area shiny with larger punctures about 0.5–1 diameter apart; gena slightly shiny, with obscure fine punctures. Mesosoma (Fig. 1E). Omaulus short and visible only in upper part ventrally of pronotal lobe; scrobe unclear. Mesoscutum with wide depressed admedian area limited by furrows; notauli short but distinct and depressed; parapsidal furrow thin, not reaching anterior and posterior edges of mesoscutum (Fig. 1E). Upper





**Figure 2.** *Odontosphex leleji* sp. nov., paratype, male **A** head, frontal view **B** head, dorsal view **C** upper frons, frontal view **D** genitalia, ventral view **E** genitalia, ventrolateral view **F** hindwing, ventral view.

third of metapleuron longitudinally elevated. Mesonotum with fine and dense punctation in anterior part, with scattered punctures at middle and more dense punctures laterally and posteriorly. Mesoscutellum with scattered punctures at middle and more dense punctures posteriorly. Metanotum matt, microsculptured, densely punctate. Dorsal part of metapostnotum punctato-rugose, almost smooth and shiny apically. Mesopleuron densely punctate, punctures partly contiguous, interspaces shiny. Propodeum dorsolaterally matt and finely wrinkled, densely punctate ventrally. Mesoscutum anterolaterally, metapostnotum at center and mesopleuron with dense semierect and sparse erect setae, length of some setae more than one midocellar diameter. Propodeum posterolaterally with erect setae, length about 1.5 midocellar diameter. Wings (Fig. 2F). Venation typical for genus. Setation. Foretarsal rake lacking, represented only by thin and rather sparse bristles; forefemur with dense semierect and sparse long erect setae ventrally. Metasoma with dense short setation forming indistinct bands at apical parts of segments. Genitalia (Fig. 2D, E). Penial valve hooklike; cuspis and digitus longitudinally elongate. Coloration (Fig. 1A). Black with reddish (brownish) and yellow pattern. Head black with light brown or yellowish mandibles (except base and apex), labrum and distal parts of mouth appendages; antenna brownish ventrally and darkened dorsally, apical flagellomeres almost completely light brown. Mesosoma black, pronotal lobe yellow. Fore and mid femora dark brown with lighter apex; hind femur, tibiae and tarsi yellowish or light brown. Tegula and wing veins basally yellow, veins brownish apically; forewing Sc+R mostly brownish. Metasomal segments 1–3 predominantly reddish brown, apical parts of segments translucent, metasomal apex reddish brown; in particular specimen, first three segments completely red.



**Female.** Unknown.

**Etymology.** The species is named after a well-known Russian entomologist Prof. Arkady S. Lelej (Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia) on the occasion of his 75<sup>th</sup> birthday.

**Distribution.** Only known from the type locality in Turkmenistan.

### Key to species of *Odontosphex*

- 1 Clypeal anterior margin bidentate. – Mauritania, Saudi Arabia, Iran, Pakistan..... ***O. bidens* Arnold**
- Clypeal anterior margin with four or more teeth..... **2**
- 2 Males..... **3**
- Females (unknown for *O. leleji* sp. nov.) ..... **7**
- 3 Clypeal anterior margin with four teeth. Flagellomeres with tyloids, without teeth or notches. – Old World species..... **4**
- Clypeal anterior margin with five teeth. Flagellomeres without tyloids, with teeth or notches (except *O. willinki*). – New World species..... **5**
- 4 Vertex and base of T1 with long erect setae. Body predominantly black. – Namibia..... ***O. damara* Pulawski**
- Vertex and T1 with short setae. Body coloration with brown, yellow and reddish pattern. – Turkmenistan ..... ***O. leleji* sp. nov.**
- 5 Eyes separated at vertex by slightly less than one-fourth transverse diameter of median ocellus. Flagellomeres with teeth or notches on F2–F6. – Argentina, Bolivia ..... ***O. paradoxus* Menke**
- Eyes separated at vertex by nearly one diameter of median ocellus. Flagellomeres with teeth or notches on F3–F5, or unmodified. – Argentina..... **6**
- 6 Flagellomeres with teeth or notches on F3–F5 ..... ***O. fritzi* Menke**
- Flagellomeres unmodified ..... ***O. willinki* Menke**
- 7 Clypeal anterior margin with seven teeth ..... ***O. paradoxus* Menke**
- Clypeal anterior margin with five teeth ..... **8**
- 8 Vertex and base of T1 with long erect setae ..... ***O. damara* Pulawski**
- Vertex and T1 with short setae..... **9**
- 9 Lateral clypeal teeth broad, apex bidentate..... ***O. willinki* Menke**
- Lateral clypeal teeth sharply acuminate ..... ***O. fritzi* Menke**

### Acknowledgements

We are grateful to Wojciech Pulawski (San Francisco, USA) as well as to the guest editor (Vladimir Gokhman, Moscow, Russia) and three reviewers (Yuriy Danilov, Novosibirsk, Russia, Christian Schmid-Egger, Berlin, Germany, and an anonymous reviewer) for their valuable comments, which helped to improve the quality of this paper.

This study was funded by RFBR and MECSS, project number 20-54-44014.



## References

- Arnold G (1951) Sphecidae and Pompilidae (Hymenoptera) collected by Mr. K.M. Guichard in West Africa and Ethiopia. Bulletin of the British Museum (Natural History). Entomology 2: 95–183. <https://doi.org/10.5962/bhl.part.27752>
- Bohart RM, Menke AS (1976) Sphecid wasps of the world. A generic revision. University of California Press, Berkeley [Los Angeles & London], 695 pp. [+ IX + 1 color plate] <https://doi.org/10.1525/9780520309548>
- Hymenoptera Anatomy Ontology Portal (2021) Electronic resource. <http://portal.hymao.org/projects/32/public/ontology/> [accessed 7 May 2021]
- Melo GAR (1999) Phylogenetic relationships and classification of the major lineages of Apoidea (Hymenoptera), with emphasis on crabronid wasps. Scientific Papers. Natural History Museum. The University of Kansas 14: 1–55. <https://doi.org/10.5962/bhl.title.4053>
- Menke AS (1967) *Odontosphex* Arnold, a genus of the Philanthinae, with a key to the tribes and genera of the subfamily (Hymenoptera: Sphecidae). The Pan Pacific Entomologist 43: 141–148. [http://researcharchive.calacademy.org/research/entomology/Entomology\\_Resources/Hymenoptera/sphecidae/copies/Menke\\_1967d\\_Odontosphex.pdf](http://researcharchive.calacademy.org/research/entomology/Entomology_Resources/Hymenoptera/sphecidae/copies/Menke_1967d_Odontosphex.pdf)
- Pulawski WJ (1991) A new species of *Odontosphex* from Namibia (Hymenoptera: Sphecidae). Proceedings of the Entomological Society of Washington 93: 953–955. [http://researcharchive.calacademy.org/research/entomology/Entomology\\_Resources/Hymenoptera/sphecidae/copies/Pulawski\\_1991a\\_Odontosphex\\_damara.pdf](http://researcharchive.calacademy.org/research/entomology/Entomology_Resources/Hymenoptera/sphecidae/copies/Pulawski_1991a_Odontosphex_damara.pdf)
- Pulawski WJ (2021) Catalog of Sphecidae. <https://www.calacademy.org/scientists/projects/catalog-of-sphecidae> [accessed 9 May 2021]
- Sann M, Niehuis O, Peters RS, Mayer Ch, Kozlov A, Podsiadlowski L, Bank S, Meusemann K, Misof B, Bleidorn Ch, Ohl M (2018) Phylogenomic analysis of Apoidea sheds new light on the sister group of bees. BMC Evolutionary Biology 18(71): 1–15. <https://doi.org/10.1186/s12862-018-1155-8>